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## PRECIOUS-METAL MINES, PROSPECTS, AND OCCURRENCES IN VIRGINIA — AN UPDATE

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### INTRODUCTION

In 1985, the Division of Mineral Resources published "Virginia Minerals", volume 31, number 4, which noted 284 gold mines, prospects, and occurrences in Virginia. This article describes nine additional unreported occurrences of precious metals (gold/silver) in Virginia. Data on these listings was compiled from old file letters, inquiries and conversations with local residents and from field investigations. This update supplements reports by Sweet, 1980; Sweet and Trimble, 1982; Sweet and Trimble, 1983; and Sweet and Lovett, 1985.

### GOLD PRODUCTION

The refinement of cyanide leaching technology by the U.S. Bureau of Mines in the 1950s is one of the factors that has led to a five-fold increase in domestic gold production from 1,465,686 troy ounces in 1982 to 7,716,168 troy ounces produced in 1989. The Bureau investigated the use of activated carbon instead of zinc to precipitate gold and silver from clay-contaminated cyanide solutions. Further refinement led to methods of desorbing (stripping) precious metals from the expensive activated carbon. This method of cyanide leaching requires an ore grade of 0.08 ounce per ton or more to justify construction of a plant.

Another technique to decrease the cost included crushing the ore to approximately 1 inch size. The ore is then heaped in a pile and leach solution sprayed over the top of it. The solution trickles through the pile and dissolves the gold and silver. The solution, collected at the base of the pile is stripped of precious metals with activated carbon. This new

technology allowed more ore to be processed at less cost and thus lower ore grades could be worked economically. Heap leaching technology has led to the rejuvenation of some of the old waste piles, tailings, and working of some ores, which grade as low as 0.03 ounce of gold-silver per ton. Many of the new operations are lower grade deposits mined in the past. Recent innovations has led to the use of large mobile conveyors (1500 feet) with the ability to produce heap leach piles 3000 feet in diameter and 60 feet high. During 1987, more than 35 new mines opened in California, Montana, and Nevada. Silver production has also increased as a by-product of increasing gold production.

East of the Mississippi, the state of South Carolina has seen two abandoned gold mines reopened and one new discovery opened since the spring of 1985; by the summer of 1990, more than 20,000 (troy) ounces of gold were being produced by Piedmont Mining Company at the Haile mine, by Westmont Mining Company at the Brewer mine, and by the Ridgeway mine. The Ridgeway mine became the 10th largest producer of gold in the United States in 1989.

### EXPLORATION IN VIRGINIA

Interest continues in the Gold-pyrite belt in the Virginia Piedmont province and the mineralized areas in the Blue Ridge province; metal-mining companies are evaluating various properties. A recent geologic and precious-metal study in Rockbridge County contains new analytical data to guide detailed exploration (Good, in preparation). Additional precious-metal mines, prospects, and occurrences in Virginia, noted since 1985, are indicated in Figure 1.

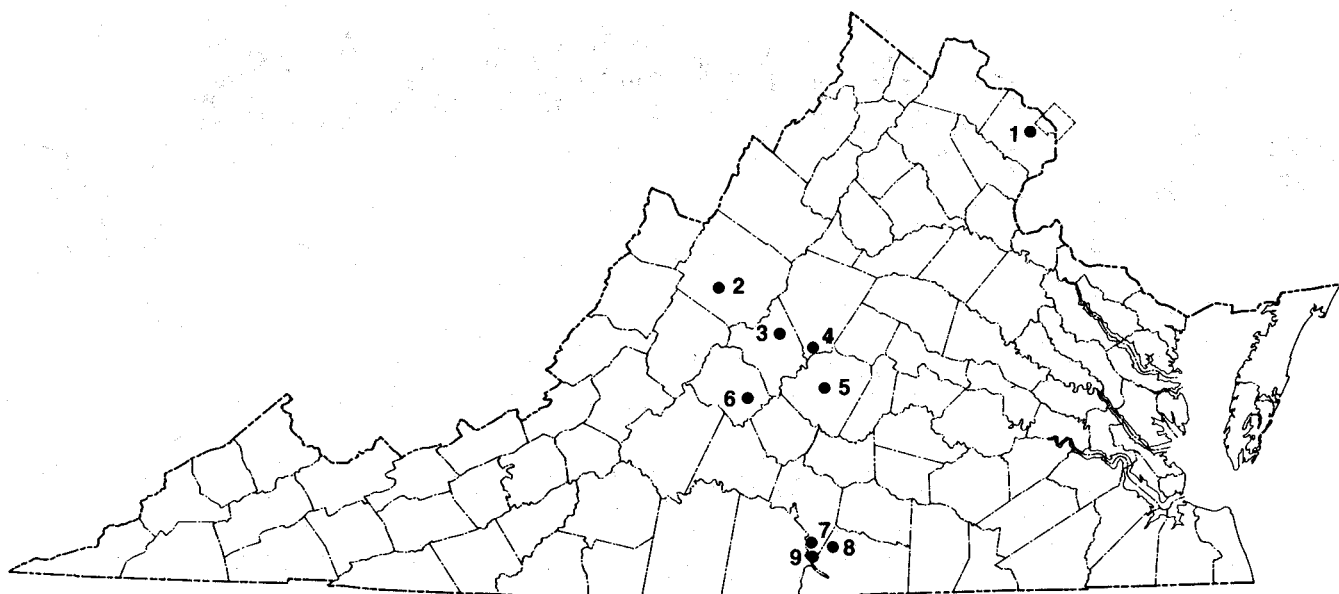


Figure 1: State of Virginia index map of additional gold/silver mines, prospects and occurrences in Virginia: 1 - Pimmet Run occurrence; 2 - Augusta Springs silver mine; 3 - Woods Mill Occurrence; 4 - Yancey gold mine; 5 - North River prospect; 6 - Dunlap mine; 7 - Edison Ridge occurrence; 8 - Barren Ridge occurrence; and 9 - Roanoke River occurrence.

#### AUGUSTA SPRINGS SILVER MINE

The Augusta Springs Silver mine (Figure 2) is located in Augusta County, on the Augusta Springs 7.5-minute quadrangle, 2.2 miles southwest of Augusta Springs on the northwest slope of Brown Ridge (N4,215,920 E644,790; Zone 17). It is noted in a letter from A. Benovitz in 1937, that H.G. Dowe along with W. M. Allihoe, began operating a silver mine on September 10, 1800. Mr. Benovitz states that lead deposits as well as a mother lode of silver were worked in Augusta County. The mine was reportedly a tunnel back in the hillside, about 4 to 5 feet high and 75 feet long. The remains of wooden torches and pieces of bowls were found in the early 1900s; Indians reportedly worked this old mine in the past (C.E. Farrar, 1988, personal communication).

In October, 1988, the mine, located on Brown Ridge, was visited. The site consists of a long series of trench cuts with one central caved area, with an inclined tunnel. The tunnel is presently accessible for about ten feet, where it is caved in with blocks of sandstone. The sandstone is fine- to medium-grained, medium to thick-bedded, and friable to indurated. The Keefer Sandstone contains some black metallic stain on joints; this stain was identified in the Division of Mineral Resources (DMR) laboratory by an X-ray (XRF) analysis as iron with some manganese. An assay was performed on a grab sample, by Northeast Geochemical and Assay Company, Yarmouth, Maine in November, 1988. Results of the assay indicate less than 0.005 (troy) ounce of gold per ton and less than 0.10 (troy) ounce of silver per ton.

#### BARREN RIDGE OCCURRENCE

The Barren Ridge occurrence (Figure 3) is located in

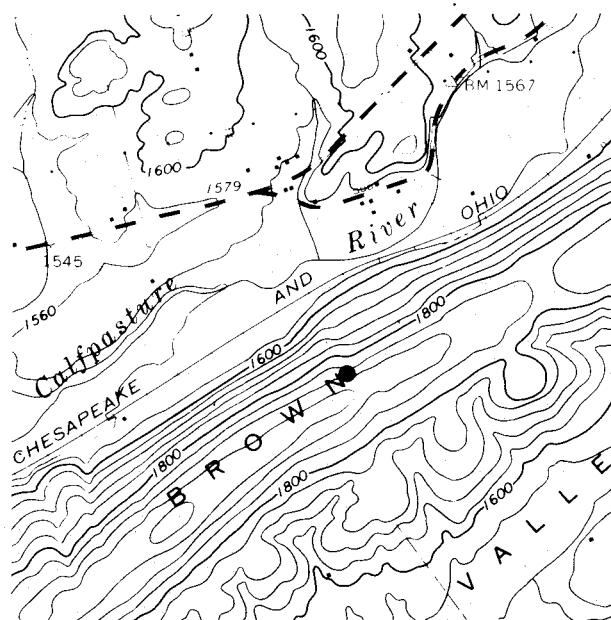


Figure 2: Location of the Augusta Springs silver mine, Augusta Springs 7.5' quadrangle, Augusta County.

Mecklenburg County, on the Wylliesburg 7.5-minute quadrangle, 1.6 miles southwest of Spanish Grove, on the northeast side of State Road 695, 1.0 mile by road northwest of the intersection with State Road 609 (N4,073,230 E716,940 to N4,073,720 E717,420; Zone 17).

A greater than 100 foot wide quartz vein (with reddish-brown iron oxide stain) extends from the road northeast for at least 0.5 mile. A grab sample from the far north end of the vein was assayed by Blue Ridge Analytical Laboratories,

Charlottesville, Virginia in late 1985. The results indicated 0.07 (troy) ounce of gold per ton (T.E. Buchanan, 1986, personal communication). A sample from the exposure on State Road 695 was assayed in March, 1986, by Iron King Assay, Inc., Humboldt, Arizona. The results indicate less than 0.001 (troy) ounce of gold per ton and less than 0.01 ounce of silver per ton.

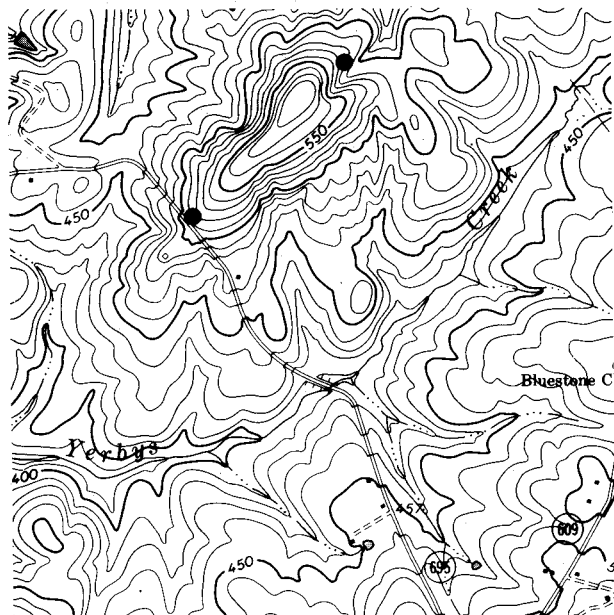


Figure 3: Location of the Barren Ridge occurrence, Wyliesburg 7.5' quadrangle, Mecklenburg County.

#### DUNLAP MINE

The Dunlap mine (Christian Tract, Buffalo Ridge prospect, Piedmont Copper) is located in Amherst County (Figure 4), on the Amherst 7.5-minute quadrangle, 5.7 miles south-southeast of Amherst, about 600 feet southeast of State Road 624 (N4,153,320 E675,870; Zone 17).

In 1879, Colonel Thomas Dunlap of Philadelphia bought 160 acres and formed the Piedmont Copper Mines. More than 30,000 pounds of copper were produced over the next 10 years, probably from the Dunlap mine, and Folly mine area, about three miles to the northeast. In 1917, Buffalo Ridge Mining Co. purchased the property, but produced no ore.

A company was formed in 1939 to clean out the shafts and search for the vein (Simpson, 1980). Mr. Mosby, who presently owns the Dunlap mine tract, reported that the company was financed with gold associated with copper in the amount of "35 ounces of gold per ton of copper." The operation was active until 1943.

The Dunlap mine is near the contact of the Lynchburg gneiss with peridotite and metapyroxenite dikes. A water-filled shaft was present at the site during the Spring of 1988 (Figure 5). Minerals present, in order of abundance, at the mine are tremolite, chlorite, malachite, chalcedony, quartz, chalcopryite, and bornite (Simpson, 1980).

A sample of malachite, chrysocolla and bornite was assayed in March, 1987, by Northeast Geochemical and Assay

Company, Yarmouth, Maine. Results indicate 0.689 (troy) ounce of gold per ton and 2.07 (troy) ounces of silver per ton.

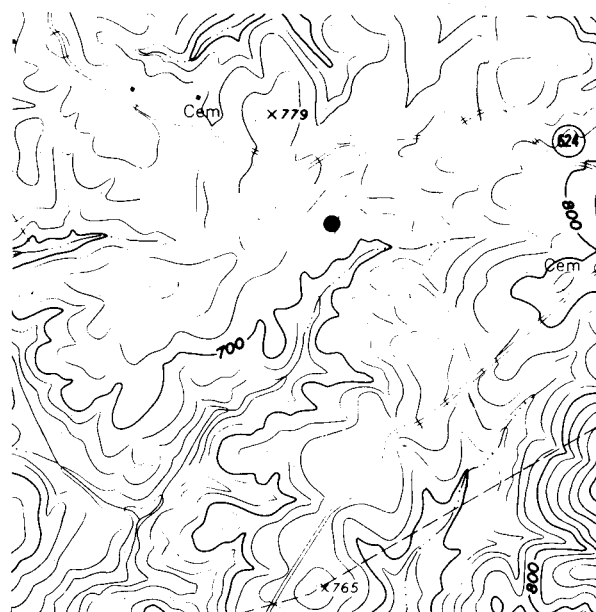


Figure 4: Location of the Dunlap mine, Amherst 7.5' quadrangle, Amherst County.

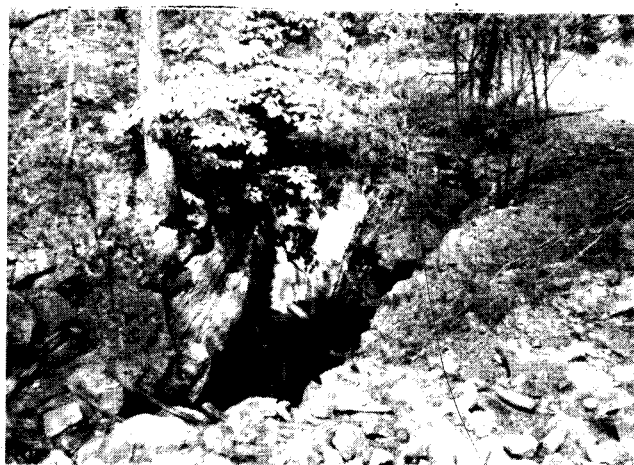


Figure 5: Water-filled shaft, near the contact of the Lynchburg gneiss with peridotite and metapyroxenite dikes, Dunlap mine, Amherst County.

#### EDISON RIDGE OCCURRENCE

The Edison Ridge occurrence (Figure 6) is located in Charlotte County, on the Clover 7.5-minute quadrangle, 3.2 miles south of Public Fork, on State Road 633 approximately 0.5 mile by road west of its intersection with State Road 608 (N4,073,110 E709,570; Zone 17).

A quartz vein crosses the road, extending at least 0.25 mile to the north and to the south; strike of the vein is N 22° E. Large pieces of vein quartz from construction of a new roadbed show both chalcopryite and covellite. Extension of the vein to the north on the hill is essentially barren on the

surface. In a ditch south of the road, a cross-cutting vein with some pyrite mineralization is in contact with a weathered chlorite schist from the Aaron Formation (Figure 7).

A sample of the mineralized quartz was assayed by Northeast Geochemical and Assay Company, Yarmouth, Maine in February, 1988. The results indicate 0.008 (troy) ounce of gold per ton and less than 0.1 (troy) ounce of silver per ton.

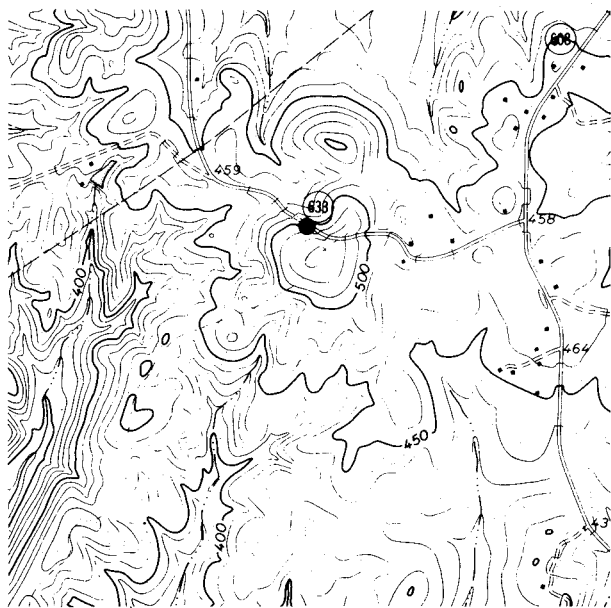


Figure 6: Location of the Edison Ridge occurrence, Clover 7.5' quadrangle, Charlotte County.



Figure 7: Quartz vein in contact with weathered chlorite schist from the Aaron Formation, Edison Ridge occurrence, Charlotte County.

#### NORTH RIVER PROSPECT

The North River prospect (Figure 8) is located in Buckingham County, on the Buckingham 7.5-minute quadrangle

on the southwest side of State Road 648, approximately 0.1 mile north of the bridge over the North River (N4,160,100 E714,500; Zone 17). Ern (1968) notes that the prospect on a quartz vein was about 20 feet long, 12 feet wide, and 10 feet deep. The vein is near the contact of a hornblende metagabbro and muscovite-chlorite phyllite with a schist. The milky quartz, with a strike of about N 15° W and was probably utilized for ornamental aggregate in the past (Figure 9).

When the road was widened in 1983, a zone of sulfides was uncovered in the roadcut; both pyrite and chalcopyrite were visible in samples (W.F. Giannini, 1987, personal communication). A sample of the sulfide was assayed by Barringer Resources, Wheatridge, Colorado in September, 1983. The sample assayed 0.05 (troy) ounce of silver per ton. A sample was also assayed by Northeast Geochemical and Assay Company, Yarmouth, Maine, in February, 1988. The results indicate 0.005 (troy) ounce of gold per ton and 0.1 (troy) ounce of silver per ton.

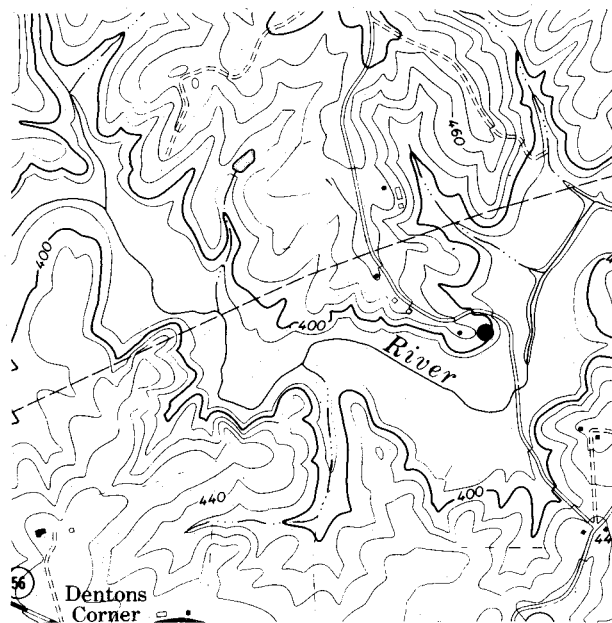


Figure 8: Location of the North River prospect, Buckingham 7.5' quadrangle, Buckingham County.

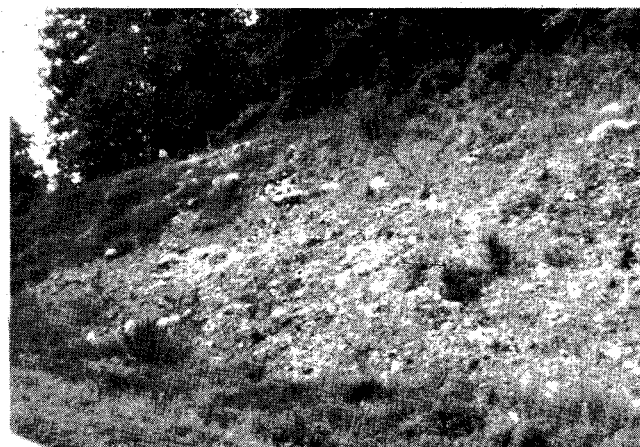


Figure 9: Quartz vein, trending northwest to southeast in the hillside, to the shallow pit on top of the ridge, North River prospect, Buckingham County.

### PIMMET RUN OCCURRENCE

A sample of gold in the museum of Natural History, Smithsonian Institution, Washington, D.C., is from Pimmet Run, which runs from just southeast of Tysons Corner, Fairfax County, east into Arlington County into the Potomac River. The area is urbanized today and there is no way to determine the location from which the sample came. The drainage does cut the regional strike of the rocks of the old Bull Neck (Kirk) mine, located three miles to the northwest.

### ROANOKE RIVER PROSPECTS

The Roanoke River prospect (Figure 10) is located 2.1 miles southwest of Laconia in southern Charlotte County, on the Buffalo Springs 7.5-minute quadrangle (N4,065,400 E708,680; Zone 17). The property is presently owned by the U.S. Army Corps of Engineers.



Figure 10: Location of the Roanoke River prospect, Buffalo Springs 7.5' quadrangle, Charlotte County.

In late 1986, two prospect pits were located in a white quartz vein in a gray, granite-gneiss country rock (Figure 11). The northernmost pit is 20 feet in diameter and about four feet deep. A large dump of barren white quartz is present to the south of the pit, near the second pit which is 15 feet in diameter and three feet deep.

### WOODS MILL OCCURRENCE

The Woods Mill occurrence (Figure 12) is located in Nelson County, on the Lovingston 7.5-minute quadrangle, just southwest of Woods Mill on the northwest side of U.S. Highway 29 (N4,190,570 E691,520; Zone 17).

It was reported that native gold occurs as bright yellow



Figure 11: Prospect pit in a quartz vein in the granite-gneiss country rock of the Red Oak granite, Roanoke River prospect, Charlotte County.

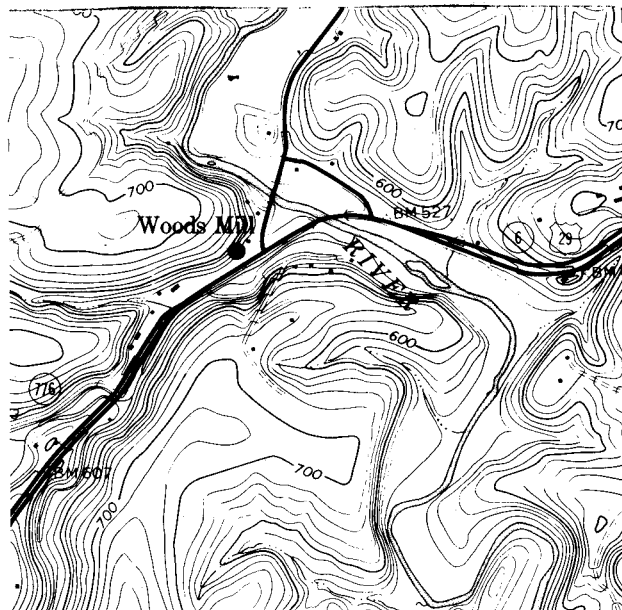


Figure 12: Location of the Woods Mill occurrence, Lovingston 7.5' quadrangle, Nelson County.

grains and aggregates as large as 0.75 mm (0.03 inch), but most commonly as specks averaging 0.25 mm (0.01 inch) in diameter. The gold occurs along small shears within layered granulite gneiss of the Archer Mountain suite of the Lovingston Formation (C.M. Dail, 1986, personal communication; Figure 13).

A sample was assayed by Northeast Geochemical and Assay Company, Yarmouth, Maine in August, 1986. Results indicate less than 0.005 (troy) ounce of gold per ton and less than 0.1 (troy) ounce silver per ton.

### YANCEY GOLD MINE

The Yancey Gold mine (Figure 14) is located in Albemarle County, on the Schuyler 7.5-minute quadrangle, 2.8 miles southeast of Schuyler, Nelson County, 0.5 mile north



Figure 13: Exposure of granulite gneiss, in roadcut on U.S. Highway 29, Woods Mill occurrence, Nelson County.

of the intersection of State Road 722 with State Road 735 (N4,182,230 E706,200; Zone 17).

This mine was operated in the late 1800s. Presently a water-filled shaft, 10 feet in diameter, in greenish-gray phyllite of the Candler Formation, remains on the site. The phyllite on the surrounding dump contains pyrite cubes that are up to 0.5 inch on the face (W.F. Giannini, 1988, personal communication).

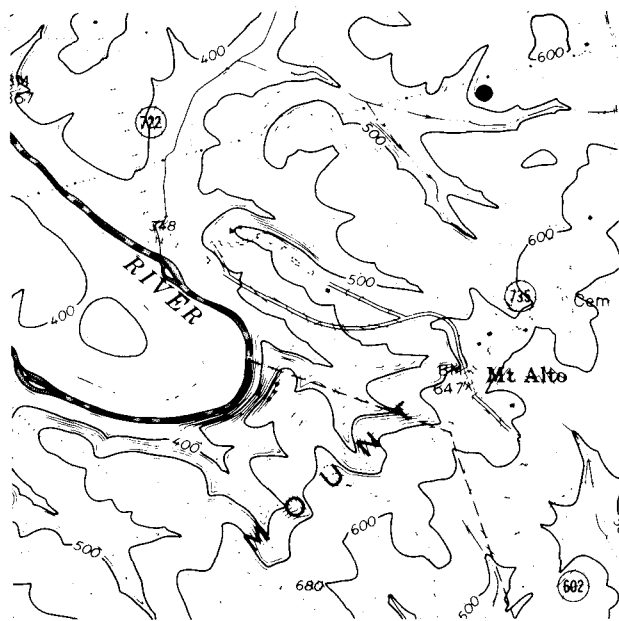


Figure 14: Location of the Yancey gold mine, Schuyler 7.5' quadrangle, Albemarle County.

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## POTENTIAL GEOLOGICAL HAZARDS

### EXPANSIVE SOILS

Expansive soils cause more damage to man-made structures in the U.S. than any other natural hazard. The damage from expansive soils is not as sudden or traumatic as that caused by an earthquake, hurricane, or tornado, but losses have been estimated to be 7.0 billion dollars annually (Krohn and Slosson, 1980).

Soils that exhibit changes in volume with variance in moisture content are called expansive soils. The capacity of a soil to manifest shrink/swell characteristics is related to the clay mineralogy and the percentage of clay present. The clay mineral, montmorillonite, and mixed layer clays containing montmorillonite have the greatest potential for shrink/swell behavior. Montmorillonites may swell in excess of 15 times their dry volume (Jones and Holtz, 1973) and can generate swelling pressures in excess of 30,000 pounds per square foot (Dawson, 1953).

Expansive soils occur and have caused damage to man-made structures in Virginia. The key to expansive soil damage is changes in the moisture content of these soils. Damage generally is caused by differential subsidence and heave resulting from differences in moisture and soil conditions. Changes in soil moisture content are typically limited to about four to five feet of depth in Virginia. Placement of supporting foundations, buried utilities, and other man-made structures on soils with adequate bearing capacities at depth in excess of four feet can greatly reduce the potential for damage from expansive soils. Conditions which locally affect soil moisture, such as poor drainage, sources of heat or cold, leaking pipes, drainage outfalls, or the presence of large trees, may enhance the shrink/swell behavior of expansive soils and result in damage to nearby man-made structures. Other causes of similar appearing damage include frost heave, inadequate bearing capacity of soils, and differential subsidence associated with karst, mining activity, or heterogeneous soil characteristics. In the absence of laboratory identification, highly expansive soils may be recognized by the formation of large cracks during droughts.

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DAVID A. HUBBARD, JR.



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- \_\_\_\_\_ physical or chemical analyses for selected mineral resources
- \_\_\_\_\_ *Virginia Minerals*
- \_\_\_\_\_ Mineral Producer Profiles
- \_\_\_\_\_ single topic brochure, such as *Sinkholes*

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